Oliver Lodge works

The result of the work of Oliver Lodge in 1889 was the union of the Hertz transmitter and the original receiver, the main elements of which are shown in the diagram in Fig. 2. Here *A* is an antenna (vibrator), *D* is a detector, *G* is a galvanometer. The first detector was, like Hertz, a miniature spark gap with the only feature that the gap between its electrodes was reduced to a minimum, followed by their contact. In 1889, Lodge discovered that under the influence of an electric discharge on such a detector, the resistance of a spark gap decreases sharply, and the electrodes are as if coupled. The chain remained closed after the cessation of the waves. To break the contact and bring the receiver in a state of readiness to receive the next signal, light shaking was required.

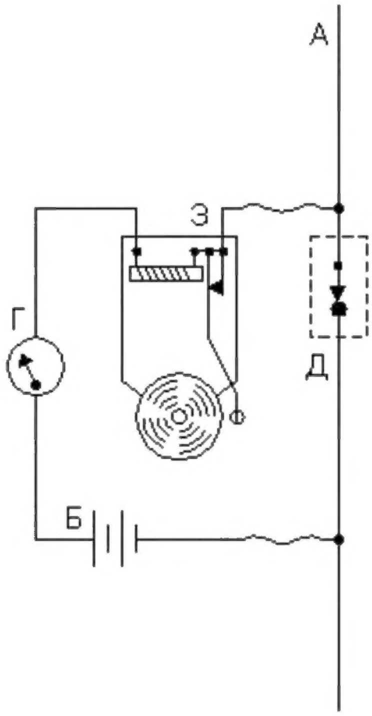

Fig. 2. Receiver Lodge

When a sensitive galvanometer was connected parallel to the spark gap in the circuit until the detector was shaken, a small current was observed caused by contact electricity. The deflection of the galvanometer needle facilitated the observation of signal reception, but the effect was weak and unstable.

When a battery *B* and an electric bell *3 were* connected to the detector, a sufficiently large current flowed in the circuit and signal reception was clearly noted not only by the galvanometer, but also by the bell. In this case, a weak signal controlled a much stronger current from battery *B*, i.e., signal amplification was achieved, which, in different versions, later became one of the foundations in radio communication devices.

If the mechanical vibrations of the bell anchor were transmitted to detector *D* , then the contact was broken and the bell was disconnected until the next wave exposure. Using the Greek equivalent of the word "cohesion", Lodge called his receiver with "interlocking" spark gap electrodes "coherer". He reported it in a report in 1890. Lodge also proposed another coherer design, more sensitive and easier to adjust. In this embodiment, the metal tip touched the oxidized surface of the aluminum plate. Subsequently, crystal detectors based on a different principle and having been used in radio communication devices since the early 1900s had a similar design.

Another detector was proposed for the radio in 1890 in France by Eduard Branly and called it "radio conductor", initiating the use of the term "radio". The single contact in the Branly receiver was replaced by many contacts between particles of metal powder or sawdust, which made the detector more stable and reliable, but this was achieved by lowering the sensitivity. In the second version of its coherer receiver, the circuit of which is shown in Fig. 3, Lodge used a radio conductor instead of a single contact. A bell still served to shake the powder.

In the third version, instead of a bell, a Morse telegraph apparatus was connected; the powder was shaken by a rotating washer mounted on the end of one of the apparatus axes. Spokes were mounted on the puck, hitting a tube with sawdust and thus shaking it.

The results of the Lodge's work were reported to him in June and August 1894 and then published. The reports were accompanied by demonstrations of the reception of radio signals from a transmitter located outside the building. To reproduce the signals, the galvanometer shown in Fig. 2. It was a galvanometer used on ships for onboard telegraph signaling; "points" and "dashes" of the Morse code were received. The lodge also said that its receiver receives waves from distant lightning discharges and that the sensitivity of its receiver can increase the signaling range to half a mile.

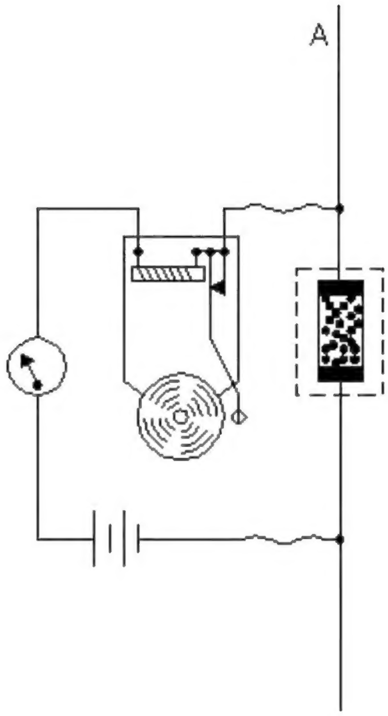

Fig. 3. Lodge receiver with "radio conductor"